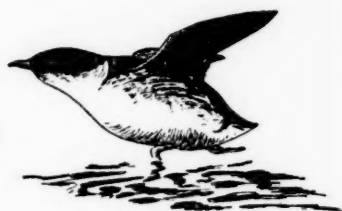


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## VARIATION IN THE CHIPMUNKS OF WEST-CENTRAL WASHINGTON

EARL J. LARRISON

### PART II

The present article is the concluding part of a paper on the variation of the chipmunks of the central Cascades and adjacent lowlands of Washington begun in the September-December, 1948, issue of the *Murrelet*.

#### AGE VARIATION

##### COLOR

*Eutamias minimus scrutator*. Lack of juvenile material prevented a study of age variation in this chipmunk.

*Eutamias amoenus affinis*. The first juvenile pelage is somewhat similar to the adult coat but differs in being slightly darker, particularly on the sides and ventral surface. Specimens indicate a fall molt in September in which the dull juvenile fur is replaced by a brighter-colored coat very similar to the winter pelage of the adults.

*Eutamias amoenus ludibundus*. The color pattern of the juvenile coat is similar to that of the winter coat of the adult, though slightly darker, especially along the sides. This pelage is replaced in the subsequent fall molt by the usual winter coat.

*Eutamias townsendii townsendii*. In the chipmunk collection of the Washington State Museum, there are three skins of very young *townsendii*. According to Mrs. Martha R. Flahaut of that institution, these specimens were born in mid-May, 1933, to a pair of chipmunks which had been captured at Crystal Lake, Snohomish County, on May 1 of that year, by Carl Rising. When the young were a week old, the parent animals died. The young chipmunks were fed cow's milk but succumbed at the end of the second week and were brought to the museum on June 2. The specimens are for the most part naked and devoid of fur, except for tactile hairs on the nose, cheeks, eye region, and forefeet, and a very short growth of hair on the nose, top of head, and dorsal portion of upperparts. The pigment in the skin shows the future color pattern fairly well. The facial stripes, with the exception of the sub-malar, are obscured by a dark color (Dusky Drab\*). The eyelids, cheeks, chin, and ventral portions are Light Orange-Yellow. The sides and outer lateral light dorsal stripes are Ochraceous-Tawny. The dark dorsal stripes are Dark Greenish Olive. It is interesting to note that the outer light dorsal stripes are much lighter in color than are the inner light dorsal stripes. This character is maintained in the hair of three juveniles taken in July and August at American Lake, Pierce County. However, a slightly older juvenile (length 193 mm.) collected May 15, 1937, at Seattle is much darker, thus resembling the adult animal. The hairless young and the American Lake juveniles of *townsendii*, then, have a color pattern suggesting that of *cooperi*. It is pertinent to query the possibility of phylogenetic significance. A comparative study of the pelages of different stages in the development of the various species and subspecies of chipmunk might be very informative.

*Eutamias townsendii cooperi*. Five immature specimens (four August and one September) from the Cascade Mountains are similar to adults in color. This juvenile pelage is very slightly paler than the adult winter coat, resembling the adult summer coat very closely. One immature specimen from Mount Rainier is noticeably darker than similarly-sized skins from the Cascades.

\* Color terms after Ridgway, 1912.

## EXTERNAL MEASUREMENTS

Growth may be divided into two types: (1) developmental growth concluding with physiological maturation of the individual, and (2) physical or post-maturational growth usually occurring as a gradual increase in body size and weight and continued deposition of mineral matter in bones and fusion of suture-separated bones. Growth may not be exactly the same in all individuals of a particular taxonomic group because it is probably affected by such factors as heredity, individual variation, state of health, and diet.

*Eutamias amoenus affinis*. Growth in external dimensions similar to that of *E. a. ludibundus*.

*Eutamias amoenus ludibundus*. When the lengths of the hindfoot, tail, and body (total length minus tail length) were plotted against the total length as a basis of comparison (Fig. 1), it was found that a near-maximum size of hindfoot was reached at an early stage and subsequent growth was very small. Tail and body lengths increased evenly and at about the same rate as the total length. Growth in these two dimensions continued equally through maturation and apparently slowly through life. With few exceptions, those specimens exhibiting the greatest external measurements were females.

*Eutamias townsendii townsendii*. Growth in external dimensions similar to that of *E. a. ludibundus*.

*Eutamias townsendii cooperi*. Maximum size is attained earlier in hindfoot than in tail and body lengths and growth is relatively slow during the final stages of

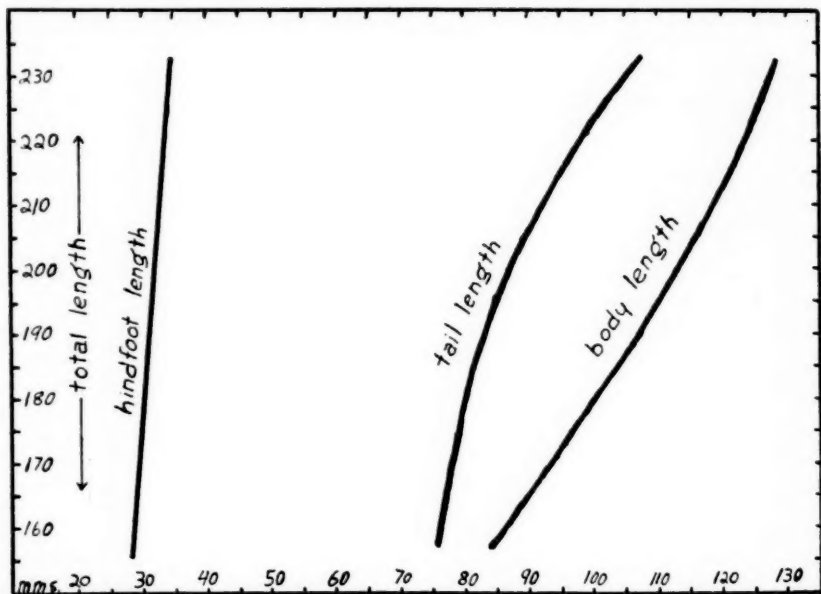


FIG. 1. Late growth in lengths of hindfoot, tail, and body in *Eutamias amoenus ludibundus* plotted against the total length.

maturation. The tail and body of this race increase at approximately even rates throughout life. Available specimens indicate that, unlike *townsendii*, the tail of *cooperi* grows at a slower rate than the body. Also, there tends to be less variation in tail and body lengths in adult specimens of *cooperi*.

#### CRANIAL MEASUREMENTS

Lack of sufficient immature material precluded a study of cranial growth in *Eutamias amoenus affinis*, *Eutamias townsendii townsendii*, and *Eutamias townsendii cooperi*.

*Eutamias amoenus ludibundus*. A study was made of skull growth in *ludibundus*, since the greatest age range was found in specimen material representing this race. Unfortunately, no very young skulls were available and the study had to be confined to half-grown to adult animals. Cranial measurements were compared with basilar length as the standard of skull growth.

The thirteen measurements thus plotted against the basilar length (Fig. 2) may be assigned to four groups based on their various rates of attaining mature size. In the first group, which contains only the post-orbital breadth, maximum size had been reached at an age earlier than that of the youngest specimen at hand. Though variation was considerable, no definite trend could be found. In cranial breadth, cranial depth, rostral width, mastoidal width, and inter-orbital breadth, measurements comprising a second group, increase in size was relatively slow as compared with that of the basilar length. A somewhat faster rate of growth was shown by the third set of measurements which included the tooth row length, rostral depth, and postpalatal length. The fourth group, containing the rostral length, palatal length, zygomatic breadth, and nasal length, exhibits the fastest rate of growth of the thirteen variates.

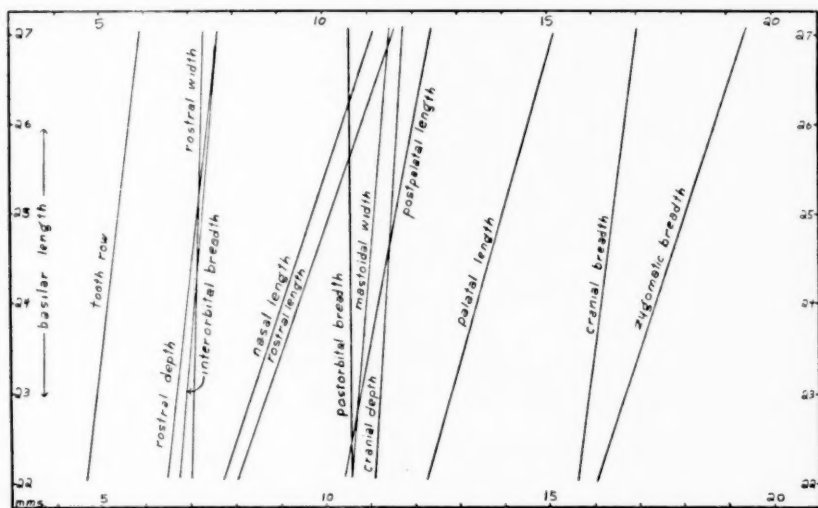


FIG. 2. Late growth in the skull of *Eutamias amoenus ludibundus* plotted against the basilar length.

To summarize, it would seem that, as is the case in most mammals, growth in the chipmunk skull during the later phases of maturation takes place most rapidly in the length of the rostrum and width of the zygoma, resulting in an elongation of the snout and a widening of the cheeks. That part of the skull enclosing the brain apparently reaches adult or sub-adult size earlier than the portion enclosing the jaws. This filling out of the face ranks with over-all increase in body size as being the most noticeable outward change in the attainment of adult size in chipmunks and ground squirrels which the writer has kept in captivity.

After completion of developmental growth leading to physiological maturation, the skull continues to grow apparently throughout the remaining life of the chipmunk. Most important items of such growth are:

1. continued fusion of the various skull bones and closing of the sutures to make the skull a more unified whole
2. a tendency for the skull to become wider and flatter
3. continued deposition of bone material on the various parts of the skull to make it larger, heavier, more massive, and less translucent
4. continued development of crests and ridges, particularly those in the parietal and occipital areas, associated with increased muscular development
5. continued wearing down of the cusps of the molar teeth

The above observations emphasize the need for using similar-aged series of specimens in making skull comparisons.

#### GEOGRAPHICAL VARIATION

Some studies were made also of geographic variation in the specimen material available. These analyses were concerned with micro-geographic (or local) variation occurring within the range of a particular subspecies or geographic race and with macro-geographic variation in characters of two related subspecies. Lack of sufficient material prevented a study of local variation in *E. m. scrutator*.

#### MICRO-GEOGRAPHIC VARIATION IN *E. a. affinis*

Color: Variation in series of specimens from different localities is noticeable. Those secured from the eastern periphery of the range in the transect, i.e., from the lower more open border of the yellow pine forests, generally have brighter paler colors and narrower dorsal stripes than skins collected in the upper denser border of the yellow pine forests or from the transitional area between the upper and lower divisions of the Palusian Montane Forest Belt. These latter skins possess darker sides and conspicuously wider stripes. In fact, a number of such specimens approach the appearance of *ludibundus* in varying degree.

#### COMPARISON OF *E. a. affinis* WITH *E. a. ludibundus*

Color: In general color pattern, *affinis* is similar to *ludibundus* but differs from that subspecies in possessing slightly lighter top of head, dark facial stripes, eyelids, postauricular patches, sides of neck, shoulders, light dorsal stripes, sides, rump, thighs, ventral parts, hindfeet, and ventral surface of tail. The cheeks, chin, dorsal surface of tail, tips of lateral hairs of tail, and tip of tail are more warmly colored (contain more yellow and orange) in *affinis* than in *ludibundus*. To summarize, typical specimens of *affinis* may be separated from those of *ludibundus* by their brighter coloration, especially on the sides, and the greater contrast between the light and dark stripes on the back.

**External Measurements:** In analyzing the external dimensions of thirty adult *affinis* and thirty adult *ludibundus*, it was found that in *affinis* the tail length averaged slightly but not significantly greater than in *ludibundus*. The *ludibundus* body was significantly longer, however. In the hindfoot length of these two groups, there is practically no difference.

**Cranial Measurements:** Statistical analysis of the skulls of thirty adults of each race reveals the following data: *Affinis* averages slightly greater than *ludibundus*, but not significantly so, in postorbital breadth and cranial depth. *Affinis* averages slightly, but not significantly, smaller than *ludibundus* in basilar length, interorbital length, zygomatic breadth, rostral width, rostral depth, tooth row length, cranial breadth, mastoidal width, palatal length, and postpalatal length. *Affinis* averages significantly smaller than *ludibundus* in nasal length and rostral length. In summary, it may be concluded that, except possibly for the length of nasal bones and rostrum, there is no important difference in cranial measurements between *affinis* and *ludibundus*.

From the above comparison, it is evident that the only usable taxonomic characters for separating the two races are those involving length of tail, length of nasals and rostrum, and the colors of the fur on the various parts of the body. Such criteria, however, are valid. That two such subspecies should be distinguishable, though their skulls are practically identical, is a frequent occurrence in *Eutamias*, particularly in the species *amoenus*.

#### MICRO-GEOGRAPHIC VARIATION IN *E. a. ludibundus*

**Color:** There is relatively little variation in coat color in specimens of this race from the different portions of the Cascade Mountains in the transect. However, skins from the eastern parts of the range of *ludibundus* where it approaches that of *affinis* are distinctly paler.

#### COMPARISON OF *E. a. ludibundus* WITH *E. a. caurinus*

Howell (1929:77) assigned most of a large series of *amoenus* from Mount Rainier to *E. amoenus caurinus*, a geographic race isolated in the mountains of the Olympic Peninsula of Washington. In a recent review of the mammals of Washington, Dalquest (1948:256-257) has placed all Rainier *amoenus* under the race *ludibundus* and has restricted *caurinus* to the Olympic Mountains. He also commented (*op. cit.*, 85) on the close similarity of the *amoenus* of Mount Rainier and the Olympics. The Rainier chipmunks, as do several other mammal and bird species of that area, present some interesting zoogeographic problems. In an effort to discover the actual identity of the Rainier *amoenus*, the writer made a detailed comparison of these animals with true *caurinus* and *ludibundus*. The results of this analysis are presented here.

**Color:** Briefly, *ludibundus* differs from typical *caurinus* in possessing a slightly paler top of head, darker tawnier sides, a slightly darker undersurface of tail not mixed with blackish, more Ochraceous on the sides of the face, and creamy white rather than pure white underparts. The rich tawny sides of *ludibundus* contrast strongly with the dull sides of *caurinus*.

In color of the sides, the Rainier *amoenus* are slightly paler than *ludibundus* but are not nearly as light as *caurinus*. About forty per cent of the Rainier material resembles true *caurinus* in that the dorsal part of the head is clearly set off from the median dark facial stripes. About sixty per cent of the Rainier *amoenus* resemble *ludibundus* in having a lighter top of head and in the fact that this surface is not

distinctly separated from the median dark facial stripes, which, on the average, are lighter than those of true *caurinus*. In the color of the undersurface of the tail, the Rainier *amoenus* are closer to *caurinus*, especially in the feature of having the edging of the tail lighter than the median ventral portion. In the color of the ventral parts, the Rainier specimens resemble *ludibundus* in the overlapping of the tawny sides onto the lateral surface of the belly. In the pale-sided *caurinus*, such a condition does not exist. The bellies of Rainier skins tend to be whiter—resembling *ludibundus*—than those of the *caurinus*. In the color and width of the dorsal stripes, the Rainier *amoenus* are closer to *caurinus* than to *ludibundus*. In the latter race, the dark stripes are equal in width, while in the Rainier skins and typical *caurinus*, the inner lateral dark stripes are broader than the others. Rainier *amoenus* are noticeably darker, particularly on the shoulders and those portions of the sides adjacent to the other lateral dark stripes. *Caurinus* skins of similar pelage are distinctly paler.

**External Measurements:** The Rainier series differs significantly from *ludibundus* and agrees with *caurinus* in tail length. No significant difference exists in body length among the three samples. Of the four groups of *amoenus* examined in this study (*affinis*, *ludibundus*, *caurinus*, and the Rainier series), the Rainier specimens average the largest in these two measurements. There are no significant differences in the values of hindfoot length of the four groups.

**Cranial Measurements:** A statistical analysis of large series of *ludibundus*, *caurinus*, and Rainier *amoenus* reveals the following facts: The Rainier series agrees with *ludibundus* and disagrees significantly with *caurinus* in basilar length, zygomatic breadth, cranial breadth, cranial depth, and palatal length. The Rainier series agrees with *caurinus* and disagrees significantly with *ludibundus* in postorbital breadth. The Rainier series agrees with both *ludibundus* and *caurinus* in interorbital breadth, nasal length, rostral width, rostral depth, mastoidal width, and postpalatal length. The Rainier series disagrees significantly with both the other two races in rostral length and tooth row length.

**Conclusions:** In color, the Rainier *amoenus* are closer to *ludibundus* than to *caurinus*. In external measurements, the Rainier chipmunks agree with *caurinus* and *ludibundus* in body length and hindfoot length. In tail length, however, the Rainier series are not separable from *caurinus*, but differ significantly from *ludibundus*. On the basis of cranial measurements, the Rainier specimens, though exhibiting some deviating means, appear to be more closely related to *ludibundus* than to *caurinus*.

The *amoenus* chipmunks on Mount Rainier may best be considered an aberrant colony of *ludibundus*. An examination of the color differences among various races of *amoenus* in the Pacific Northwest indicates that the atypical characters of the Rainier population are not sufficient to mark it as a taxonomically separable race. Rather, the writer would designate this group as a "micro-geographic race."

The relation of the Rainier *amoenus* to *caurinus* is a little more obscure. In the characters examined here, the Rainier chipmunks appear to be intermediate between *ludibundus* and *caurinus*. At present, the Mount Rainier area is not separated ecologically from the main Cascade Range, but is effectively isolated from the Olympic Range, as regards *amoenus* habitats. The Cascades and the present Olympics were never joined by a connecting range and the Puget Sound Basin existed before chipmunks lived in the region. According to Dalquest (*op. cit.*, 85), the present *caurinus* are derived from a stock of *ludibundus* that moved westward from Mount Rainier and became isolated on the Olympic Peninsula. Would it then follow that the present Rainier *amoenus* are part of this "*ludibundus*" migration that became isolated in

transit and represents a central part of a broken cline? However, one would expect the population of Mount Rainier to be partially, if not entirely, swamped by the *ludibundus* of the adjoining mountains. Possibly there are elements in the *amoenus* environment of the Rainier area which have called forth the morphological responses differing from those controlled by the adjacent Cascades. Considerably more study will be necessary to an understanding of such problems as these in the genus *Eutamias*.

#### MICRO-GEOGRAPHIC VARIATION IN *E. t. townsendii*

Color: No marked geographic variation was noted in specimens from the relatively small and homogeneous area of the *townsendii* range included in the transect. Skins from the lower slopes of the Cascade Mountains, however, show approach to *cooperi* in possessing a slightly lighter coat color.

#### COMPARISON OF *E. t. townsendii* WITH *E. t. cooperi*

Color: In general color pattern, *townsendii* resembles *cooperi*, but differs from the latter in possessing a darker top of head, sides of nose, dark facial stripes, light facial stripes, ears, postauricular patches, sides of neck, shoulders, light dorsal stripes, sides, rump, thighs, feet, and tail. There being considerable whitish in the light dorsal stripes of *cooperi*, the light and dark dorsal stripes of that race present a much greater contrast than in *townsendii*. Typical specimens of *cooperi* may be readily separated from those of *townsendii* by the "bleached" appearance of the former. Specimens in the intergradation zone on the lower western levels of the Cascades are lighter than typical *townsendii* and darker than typical *cooperi*.

External Measurements: In statistical analysis of thirty adults of *townsendii* and thirty adults of *cooperi*, it was found that *cooperi* averaged slightly, but not significantly, smaller than *townsendii* in body length, tail length, and hindfoot length.

Cranial Measurements: In a study of the skulls of thirty adults of each race, it was found that *cooperi* averaged slightly, but not significantly, smaller than *townsendii* in interorbital breadth, rostral depth, rostral length, and postpalatal length. Nasal lengths were practically identical in the two races. *Cooperi* averaged significantly smaller than *townsendii* in basilar length, postorbital breadth, zygomatic breadth, rostral width, tooth row length, cranial breadth, cranial depth, mastoidal width, and palatal length. *Cooperi* and *townsendii* thus vary significantly in nine out of fourteen cranial measurements.

#### MICRO-GEOGRAPHIC VARIATION IN *E. t. cooperi*

As Howell pointed out (1929:111), the *cooperi* specimens from Mount Rainier are somewhat darker in color than typical Cascade skins, thus resembling the *cooperi* on the Olympic Mountains. In examining the specimens of *cooperi* available in this study, the writer found that skins from Mount Rainier averaged darker and tawnier than series from the Cascades. This is noticeable, particularly, in the general tone of the upperparts and in the color of the median ventral portion of the tail which is darker in the Rainier series. As far as fur color is concerned, the Rainier *cooperi* resemble *townsendii* to a certain extent. Immature *cooperi* from the Olympics are considerably darker than similarly-sized *cooperi* from the Cascades and resemble immatures available from Mount Rainier. Specimens from Chinook Pass are darker than most Cascade skins, thus resembling the series from Mount Rainier, just to the west of the pass. Like the Rainier *amoenus*, the *cooperi* in that area apparently rep-

resent a micro-geographic race, deviating slightly from typical *cooperi*, but not possessing characters sufficiently marked to merit separate taxonomic consideration.

Again, the relationship of the Rainier *cooperi* to those of the Olympics is difficult to understand. Dalquest (*loc. cit.*) believes that the Cooper's chipmunks of the Cascades and Olympics developed their *cooperi* characters independently *in situ*. If such were the case, the *cooperi* environment of the Rainier area must be somewhat different from that of the adjacent Cascades—a condition yet to be demonstrated.

#### SUMMARY

This paper reports on the individual, secondary sexual, seasonal, age, geographic, and micro-geographic variation occurring in five races of western chipmunks belonging to three species occupying the central Cascade Range of Washington. The studies were concerned chiefly with coat color and external and cranial measurements. Individual variation was found to be small and relatively unimportant. There seemed to be no significant variation between sexes other than that superficially caused by the differences in molting times. The summer and fall molts produce two pelages, the summer and winter, respectively, with the females molting considerably later than the males. Lack of gradational series of immatures prevented a detailed study of age variation, but in an analysis of a group of half-grown to adult specimens of one race, it was found that skull growth during the later phases of maturation results in elongation of the muzzle and widening of the cheeks, the "brain case" reaching adult size earlier than the bones enclosing the jaws.

Geographic variation was manifested most importantly in fur colors. Except in areas of intergradation, related subspecies may be validly separated on the basis of external color. In the region studied, micro-geographic variation (variation within a subspecies) was slight but noticeable, being most evident in the two chipmunk species of the Mount Rainier area, which, while deviating slightly from neighboring populations, may best be considered as aberrant local colonies or micro-geographic races.

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## FIELD OBSERVATIONS ON THE GROWTH OF YOUNG MOUNTAIN POCKET GOPHERS

LLOYD G. INGLES

The mountain pocket gopher (*Thomomys monticola* Allen) occurs in the Canadian and Transition life zones. In California it ranges north from eastern Tulare County along the Sierra Nevada Mountains and from Yolla Bolly Mountain in the coast ranges. As the species goes well up into Oregon it follows the life zones down to lower elevations until, at the mouth of the Rogue River, it occurs near sea level.

In connection with the study of the ecology of this species near Huntington Lake (elev. 7,000 ft.), Fresno County, California, the weights of marked animals were collected in all seasons for a period of two years. Eight of the animals studied were marked as juveniles, and each repeated three or more times in the traps between the time of their marking and the first of December the same year. By plotting the weights of these animals as recorded at the time of each capture rough curves indicating growth are represented (See Fig. 1 next page).

No lactating females were taken later than the middle of August, and no external evidence of sexual activity in either sex was observed before the middle of May nor later than the middle of June. It seems safe to assume, therefore, that the mountain pocket gopher has but one litter each year, born in the late spring, and that the young do not breed until the following spring. The young animals are not captured in the runways until they have attained about one-third to one-half the size of the adults. The data given here were all collected from young animals caught in the runways in live traps. When first captured all were in the juvenile "blue" pelage.

The sexes of these juvenile pocket gophers could not be determined in the live traps, but the final weights for the rapidly growing numbers 11 and 11c suggest that they might be males. (See Fig. 1.) However, there was some reason to believe that the home ranges of these two animals were more favorably located with regard to plentiful food than were the home ranges of the others. All of these animals appear to have attained adult size by the middle of October, at which time the ground freezes and is covered with snow more or less continuously until late spring.

The juvenile pelage is shed during August, being replaced by brownish hair. The first molt may occur along a regular transverse line which moves from the head toward the rump, or the molt may be irregular with the bluish pelage coming off in irregular patches.

Adults of the mountain pocket gopher taken in all seasons gave the following means and ranges of weights in grams: 26 males—91.1 (80–111); 53 females—78.7 (61–99).

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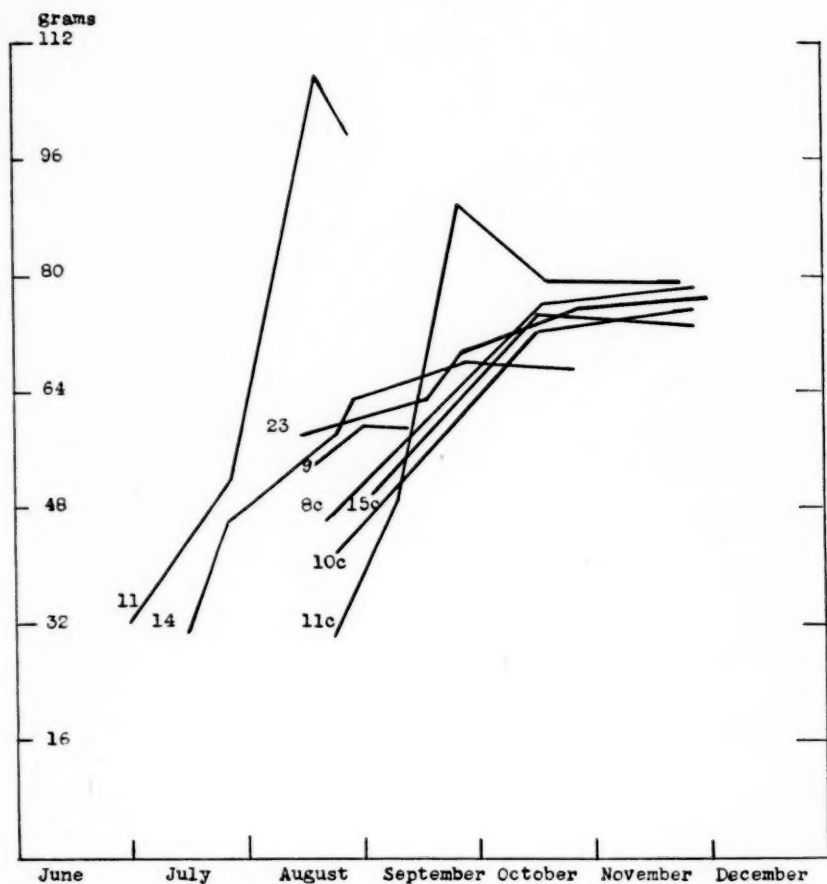


Fig. 1. Rate of growth of young mountain pocket gophers.

## PREDATOR CONTROL POLICY OF THE WASHINGTON STATE DEPARTMENT OF GAME\*

WALTER NEUBRECH

The control of certain wild animals and birds that were classified as predators in the state of Washington, as well as in other states of the Union, makes many years of history. The first organized effort to control the predator population in this state came early in the nineteenth century. It was administered by individual counties by offering a reward or bounty to encourage the taking of certain species of wildlife which were considered undesirable. Funds for carrying out this program were secured in various ways, such as dog tax, assessments against livestock, appropriations from general county funds, etc. By no means were the counties consistent in naming the species on which bounties were offered nor the method of marking them for bounty. Neither did all of the 39 counties in the state take part in this method of control.

Inasmuch as the counties raised funds to support such a program, it became the duty of the county auditor to mark these animals for bounty and to approve and pay the claims. In many cases the county auditor had little or no knowledge of wildlife and became an "easy mark" for those attempting to present fraudulent bounty claims. This system was interrupted in 1929-1930 after eight eastern Washington counties had paid out the sum of \$14,740 in fraudulent bounty claims for predators taken in other states and in Mexico. This resulted in the arrest and conviction of nine persons who were sentenced to the Washington State Penitentiary. After this occurrence the method of controlling predators by bounty was generally frowned upon, with the leading newspapers in the state writing editorials which criticized this method of control.

However, after a few years this situation was more or less forgotten and a new crop of bounty advocates appeared, which resulted in the 1935 Legislature placing a bounty of \$1.00 on coyotes, \$5.00 on bobcats, and \$25.00 on cougars, which was supposedly a plan that would reduce predators in a couple of years to the extent that their numbers would be less, and there could therefore be an increase in the amount paid for each species without increasing the appropriation. With this thought in mind the 1937 Legislature raised the bounty on coyotes to \$2.50 and on cougars to \$50.00, while the bounty on bobcats remained at \$5.00. Again in 1939 the bounty on coyotes was raised to \$5.00, with \$1.00 offered for pup coyotes. The bounty on bobcats and cougars remained unchanged. This plan remained in effect until 1945 when it became very evident that bounties alone had not reduced the predator population, but rather that it had increased. In 1935, when these bounties were first offered, the state paid bounties on 4,006 coyotes, 1,760 bobcats, and 94 cougars. The last year under this system the state paid bounties on 6,011 coyotes, 1,151 bobcats, and 213 cougars. During this ten-year period the State Game Department paid bounties on 69,209 coyotes, 15,457 bobcats, and 999 cougars. There was absolutely no correlation between the number of predators taken and the reward offered. A complete survey revealed that a very large number of coyotes on which the state paid bounties were taken by elk,

\* Résumé of a paper presented before the Pacific Northwest Bird and Mammal Society at Pullman, Washington, on May 22, 1948. In view of the current interest in the problem, the editors felt that the publication of this paper by the chief of the Predator Control Division on the history of predator control in the state of Washington, and the events which determined the present policy, would be very much worthwhile.

deer, and bird hunters during the open hunting season, also by persons who hit these animals on the highway with their cars, and by others who dug the young coyotes from dens, which I claim would have been destroyed regardless of the reward offered. Further, the check showed that a large portion of those taken in traps were taken to relieve damage to poultry, sheep, and so forth, which again was done for the protection of livestock rather than for the reward offered. Money to support this program was received from the sale of metal big game seals, with an appropriation of approximately \$100,000 per biennium from the State Game Fund, with this department administering the program.

Complaints of predators damaging livestock and game became increasingly greater, and in 1945 the State Legislature, at the insistence of the public, somewhat modified the predator law to the extent of doubling the appropriation and giving the State Game Commission authority to spend the money as it saw fit. After the Legislature had granted the Game Commission authority to spend the appropriation, it established a Predator Control Division as part of the State Game Department. The amounts offered for bounty remained unchanged, and in addition, a staff of 15 salaried men were employed whose duties were to control all species of wildlife that were felt to be injurious to the public welfare of the state. Each of these 15 men had a district to cover and were to take care of all complaints of predation, which meant control not only of coyotes, bobcats, and cougars, but also of skunks, foxes, magpies, crows, great-horned owls, and a few species of hawks that were considered more detrimental than beneficial. These men also carried commissions and assisted in protection when they encountered a violation, as well as spending full time on protection during the hunting seasons.

Since I have mentioned winged predators, I would like to tell you something regarding our policy in this matter. During the three years the Predator Control Division has operated we have had three meetings at each of which mounted specimens of the various hawks and owls were exhibited, and we conducted a class on the identification of these species. A written guide has been prepared and supplied to each of these men which would assist them in identifying the species of hawks and owls. This was followed by several departmental bulletins which carried requests to "know your hawks" and discouraged the destruction of wild animals and birds except those classified as predators. Today it is difficult to find these men in error on the identification of hawks and owls.

The Washington State Game Department is self-supporting and receives its revenues mainly from the sale of hunting and fishing licenses. Since the department pays the bill for predator control, our first interest, naturally, is to the game birds and game animals, and state predator hunters are so instructed. However, we have never refused to assist agriculturists whenever and wherever possible. I might add here that generally speaking the state predator hunter does not offer much competition to the bounty hunter, as they do not work the same areas. This is particularly true in the control of coyotes and bobcats. Although this program is less than three years old we feel that considerable progress has been made.

During the three years we have had state hunters we feel that we have reduced the number of magpies to only a fraction of the former population. The skunk population, which in certain areas was interfering with the nesting of upland game birds, has also been materially reduced. We also feel that our men are well qualified to satisfy all complaints of damage by coyotes, or in fact by any predator, immediately after receiving the complaint.

May I cite one of many cases that occur each winter. A complaint was received that coyotes had killed 5 deer. A state predator hunter was sent to the area, where he found that a total of 7 deer had been killed by coyotes. The immediate area of killing was poisoned and a total of 27 dead coyotes resulted. The destruction ceased, and the important fact was not the number of coyotes taken but that the killing stopped. I feel certain that without the services of the predator hunter this situation would have continued until the snow left in the spring.

In our state we feel that our responsibility is to control predation done by predatory animals and birds, and is not necessarily that of extermination. Damage done by predators is local in extent, and therefore control should be local. Usually local damage is done by predators that develop a habit or acquire a taste for game, livestock, or poultry. The manner in which local control of predators is effected is important in wildlife management. It has been demonstrated many times in various states of the Union that, regardless of how high the bounty is set, it does not necessarily control predation. The bounty system may be considered more of a blanket control.

Control of predators through the bounty method is still quite popular in this state, as many residents in the rural districts are always ready to voice their approval of any plan that might result in collecting a little spending money at someone else's expense. We still have requests to increase bounties and also to place other animals and birds on the bounty list. However, there is an increasing opposition to the control of predators through bounty from sportsmen and ranchers who are actually being hurt by predators. These men are interested in relief rather than in the rewards offered, and they are continually requesting the services of the salaried hunters who are in a position to offer them immediate relief.

The federal government also maintains a staff of predator hunters in this state which is partially financed by an appropriation from the State Department of Agriculture; and therefore their main interest is toward the needs of agriculture.

State predator hunters accounted for more than 5,000 coyotes last year, with bounties being paid on more than 6,000 of these animals; and federal government trappers took more than 4,000, making a total of more than 16,000 coyotes taken in Washington in 1947.

Washington State Department of Game  
Seattle

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**Further Notes on Bush-Tits in Satus Canyon, Washington.**—Mr. John B. Hurley's note (*Murrelet*, 30:19) prompts the writer to put on record the following information. On June 4, 1948, H. W. Higman and the writer, while making a preliminary ecological reconnaissance of the Satus Creek area, observed bush-tits (*Psaltiriparus minimus* subsp.) in two localities near the creek. Higman saw several bush-tits in riparian growth about one hundred yards east of the highway bridge over Satus Creek at 975 feet elevation on the boundary between sections 26 and 27, T. 9 N., R. 19 E. On the same day the writer observed a group of six bush-tits in brush along Satus Creek near the mouth of Logy Creek at an elevation of 1,145 feet. Although examination of the bird fauna was made at ten localities between the mouth of Logy Creek and Satus Pass (3,149 feet) during the next several days, no further bush-tits were found.—EARL J. LARRISON, *Department of Biological Sciences, University of Idaho, Moscow, Idaho.*

## GENERAL NOTES

**Some Unusual Birds from Eastern Washington.**—The following birds were collected in Yakima County, Washington, and were recently examined by Stanley G. Jewett for exact identification. In the case of the Alaska pine grosbeak, the specimen was also submitted to Alden H. Miller of the Museum of Vertebrate Zoology, University of California at Berkeley, who concurred in the identification.

California Pygmy Owl (*Glaucidium gnoma californicum*). Adult female November 9, 1947, Snipe's Dry Creek, Yakima Indian Reservation.

Alaska Hermit Thrush (*Hylocichla guttata guttata*). Adult female, April 25, 1948, south fork Ahtanum River, three miles west of Tampico.

Alaska Pine Grosbeak (*Pinicola enucleator alascensis*). Adult female, April 11, 1948, Logy Creek, Yakima Indian Reservation.

Kodiak Pine Grosbeak (*Pinicola enucleator flammula*). Adult breeding male, June 24, 1928, Granite Lake, Miners Ridge area, altitude 5,500 feet.

Cassiar Junco (*Junco hyemalis cismontanus*). Adult female, March 23, 1947, five miles east of Yakima. This race is a rare spring and fall migrant in this area.

Kodiak Fox Sparrow (*Passerella iliaca insularis*). Adult male, December 21, 1947, Mabton.

British Columbia Song Sparrow (*Melospiza melodia inexpectata*). Uncommon fall migrant. Specimens have been collected at Mabton, Satus Creek, Harrah, and Logy Creek in 1948.—JOHN B. HURLEY, Yakima, Washington.

**Gyr Falcon Taken in Eastern Washington.**—A female gyrfalcon (*Falco rusticolus*) taken near Chewelah, Stevens County, and deposited December 18, 1948, in the Charles R. Conner Museum, State College of Washington, Pullman, is a "first" for this species at the museum (WSC No. 48-473). The bird was seen feeding on a cock pheasant and was subsequently killed by Game Protector Lawrence Springel. The stomach contents, examined by Dr. George E. Hudson, curator of the museum, consisted entirely of meat and feathers of the pheasant. The gyrfalcon weighed 1,635 grams. Its length was 587 mm.; wingspread 1,185 mm.; color gray.

This record constitutes one of the very few for the state of Washington.—GARDNER F. JONES, Pullman, Washington.

**Sight Record of European Widgeon in Eastern Washington.**—On March 18, 1949, while at the State Game Department fish hatchery located in the city park of Walla Walla, Washington, I walked to the feeder pond to observe the ducks. One unusual bird was noted among the dominant mallards and baldpates. Its typical widgeon shape and bill, creamy crown and reddish head, proclaimed it a male European widgeon (*Mareca penelope*). Observations were made with binoculars under good light and at a minimum distance of 30 yards. Bjarne Jones, then superintendent of the fish hatchery, also observed the bird.

Helmut K. Buechner, instructor in Wildlife Management at the State College of Washington, with students Frank Harbert and Fred Zwickell, also saw it and verified the identification on March 26, at 11:45 a.m. The writer again observed the bird on March 30 at 9:00 a.m. Mr. and Mrs. Buechner and Mr. and Mrs. Haines saw it on April 3. The writer made observations on the area April 15 and 18, but the widgeon was not seen.—CARL V. SWANSON, District Biologist, State of Washington, Department of Game, Starbuck, Washington.

**White-fronted Geese in Eastern Washington.**—Although the white-fronted goose (*Anser albifrons albifrons*) has been considered a regular, but never abundant migrant in spring in eastern Washington, there are no specific published records, so far as the writer knows. Consequently a flight of this race in the spring of 1949 may be of interest.

On April 4, 1949, Henry A. Hansen, Waterfowl Biologist of the State Game Department, Kenneth Gehrman, graduate student at the State College of Washington, and the writer observed six of these geese grazing on the grassy shore of Colville (Sprague) Lake in Lincoln County. The geese allowed us to approach within a hundred yards, where detailed observations were made with binoculars. Mr. Hansen observed nine at the same lake later in the week.

Ralph C. Winslow, Manager at the Turnbull National Wildlife Refuge, wrote the following: "Twenty-seven White-fronted Geese (in one flock) were observed on March 10, 1949, resting on the south shore of Stubblefield Lake, Spokane County. The following day an attempt was made to recheck this area for White Fronts since it was thought there might have been additional geese on the lake. However, due to high winds and mists, none could be seen, but their calls could be heard."

Robert Harris, a graduate student in Game Management at the State College, shot two white-fronted geese on a lake about one mile northwest of Williams Lake, Spokane County, October 26, 1945.—CHARLES F. YOCOM, *Department of Zoology, State College of Washington, Pullman, Washington.*

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#### IMPORTANT NOTICE TO MEMBERS

In accordance with action taken at the April meeting, a committee, consisting of Arthur Svihla and Victor B. Scheffer, was appointed to consider proposed changes in the By-Laws. The recommendations of this committee were read at an Executive Board meeting held at the University of British Columbia, June 17. In essence they stated:

1. While the name of the Society is admittedly cumbersome, it has become well known and is specific. If there is a strong feeling for a change, however, the members should be given an opportunity to express an opinion before action is undertaken.

2. That a slip should be inserted in the next issue of *The Murrelet* so that members might vote on a change in the date of the annual meeting.

3. That the question of the addition of a region in Alaska should be tabled until there is a sufficient number of members in the area to support such a region.

The Executive Board voted to accept the report of the committee. In this issue of *The Murrelet* you will find a slip containing the questions on which you are asked to express an opinion. Please read carefully the minutes for April, mark your choices on the slip, and return it at once to Margaret A. Ivey, Secretary, Pacific Northwest Bird and Mammal Society, State Museum Building, University of Washington, Seattle 5, Washington, in order that replies may be considered at the December meeting.—G. CLIFFORD CARL, *President.*

#### FORECAST OF MEETINGS

The following dates and places for meetings have been established: October 1—University of Idaho, Moscow, Idaho; November 5—Seattle, Washington; December 10—Tacoma, Washington. Plan to set aside these dates, and attend the meetings if possible. You are sure to enjoy the programs and discussions with fellow naturalists. Further details concerning the meetings will be sent on the usual post cards.

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#### INDEX TO THE MURRELET TO BE PUBLISHED

Five-year, cumulative indexes for *The Murrelet* are well under way. The index for volumes 21-25 (1940-1944) will be issued toward the end of this year, and the index for volumes 26-30 (1945-1949) at the close of volume 30, probably soon after the first of next year. They will be issued at cost, not more than \$1.00. It is imperative that persons wishing to obtain the index place their orders in advance, as only a limited number of copies will be printed. Write to the Editor.

This accomplishment has been made possible through the efforts of Gordon D. Alcorn, G. Clifford Carl, Murray L. Johnson, Earl J. Larrison, and James A. Macnab, who shared with the Editor the tedious task of writing the index slips.

## ADDITIONS TO SOCIETY LIBRARY

KITCHIN, E. A. 1949. *Birds of the Olympic Peninsula*. Olympic Stationers, Port Angeles, Washington. x + 262 pp., 70 line drawings and wash paintings by Elizabeth L. Curtis and Edmund J. Sawyer, 3 photos, and 1 map. Cloth, \$3.50.

The reviewer can remember, only a little while ago, when not a single part of the Pacific Northwest was covered by a book on birds or mammals. In the last few years, however, the situation has almost completely changed. One of the few remaining areas to be treated was the Olympic Peninsula, perhaps America's last great remaining wilderness. It is a fortunate thing that one of the Society's most valued members, E. A. Kitchin, has been able to reach a long-sought goal in publishing a book on the birds of the Olympics.

According to the subtitle, the book is "a scientific and popular description of 261 species of birds recorded on the Olympic Peninsula, either as resident, summer resident or in migration, together with descriptions of their nests and eggs." But it is something more than this. It is infused with the warmth of "Kitch's" Scotch personality, with anecdotes of bird excursions in the old Caurinus Club days, with memories of some of the founders of the Bird and Mammal Society, and with observations on birds in various parts of Washington.

Following a frontispiece photograph of Kitchin, the introductory material covers such items as a preface, table of contents, other publications by the author, general description of the Olympic Peninsula, life zones, habitats within life zones, bird divisions in the state of Washington and on the peninsula, migrations, forest protection by birds, and food and food habits. A page of sketches illustrates the topographic areas of a bird. Then follow 241 pages of descriptions of individual species and subspecies, which are in reality miniature word portraits of the forms considered, and make very interesting reading.

The 70 figures include drawings and paintings of 155 birds. As appendices, the book also includes a hypothetical list, a biography of the author by C. N. Webster, and an index.

Both ornithologist and bird lover will find this book absorbing reading. Some of the scientific nomenclature may not be in the latest style, but Northwest bird students have been more interested in studying the distribution, ecology, and life histories of their birds than in keeping up with the vagaries of taxonomy. Witness the trials of the generic name of the pileated woodpeckers in the last two A. O. U. Checklist Supplements. Mr. Kitchin's book well illustrates the fact that there is much more to a bird than its name.—EARL J. LARRISON.

ZIM, HERBERT S., and GABRIELSON, IRA N. 1949. *Birds—A Guide to the Most Familiar American Birds*. Simon and Schuster, New York (a Golden Nature Guide). 155 pp., 118 full color illustrations by James Gordon Irving. Bound, Pocket size. \$1.00.

Much thought has gone into the composition of this small book, to make it as generally useful as possible to the greatest number of persons. It is strictly a book for the amateur in bird study. With colored pictures of 112 of the most familiar American birds, the authors have made it possible to recognize over 250 birds by describing related and similar species. With the aid of ingenious colored distribution maps the user of this book may determine which related species is found in his area, whether it is a summer, winter, or permanent resident, or whether it merely passes through on migration. Twenty-two pages of tables give data on arrival and departure dates, food, eggs, and nests. This reviewer is glad to see authentic, low-priced nature books once again being offered.—MARTHA R. FLAHAUT.

BENT, ARTHUR CLEVELAND. 1949. *Life Histories of North American Thrushes, Kinglets, and Their Allies*. Washington, D. C. U. S. Nat. Mus. Bull. No. 196. 454 pp., 51 plates (photos.). Supt. of Docs., Govt. Print. Off. Paper cover, \$1.50.

It is gratifying to see an acceleration in the issuance of this important series, the present volume being the seventeenth. The manuscript was completed in 1943, and it follows the same general plan of its predecessors, utilizing the nomenclature of the 1931 Checklist of the American Ornithological Union.—MARTHA R. FLAHAUT.

BROCKMAN, C. FRANK. 1949. *Trees of Mount Rainier National Park*. University of Washington Press, Seattle. 49 pp., 36 illus. (photos.). Pamphlet, 75c.

A short discussion of forest types and associations is followed by more detailed treatment of each species. Photographs of cones, flowers, or fruit, as the case may be, and foliage, are made against inch-square graph paper. There is a helpful field key. Since the park boundaries include all elevations found in western Washington, this work would be valuable for a greater area than the title suggests. One would wish that some of the illustrations, reproduced by the offset method, might be inked more heavily, but this may have been due to difficulties in the photographs from which the plates were made. The type is one of the most pleasing styles seen in a long time.—MARTHA R. FLAHAUT.

## SOCIETY MEETINGS

APRIL, 1949.—A regular meeting of the Society was held at the Washington State Museum, University of Washington, Seattle, April 30, 1949, with Vice President Murray L. Johnson presiding.

The following persons were elected to membership: Dr. H. E. Alder, Spokane, Washington; Girard C. Baker, Pullman, Washington; Wayne E. Doane, Cashmere, Washington; Gardiner F. Jones, Everett, Washington; Dr. Ralph W. Macy, Portland, Oregon; Marie S. Pabst, Bellingham, Washington; Dr. Burton T. Ostenson, Parkland, Washington; Mrs. Murray Johnson and Mrs. Thelma Gloyde, Tacoma, Washington; Mary Ford Eddy and Josiah Collins, Jr., Seattle, Washington; George Mitchell, Tahsis, British Columbia; and J. Dan Webster, Jamestown, North Dakota. Dr. R. R. Huestis, Eugene, Oregon, was reinstated to membership.

Gordon D. Alcorn, Chairman of the Publications Committee, reported that the five-year index for volumes 21-25 of *The Murrelet* was long overdue, and that another index would be due at the end of this year. The committee recommended the issuance of these indexes, and that they be sold at cost. Some of the members of the executive board had offered to index one volume each. The recommendation of the Publications Committee was accepted.

Garrett Eddy reported that three changes in the By-Laws had been suggested, namely, to adopt a briefer name for the Society, which many members thought was too cumbersome; to include Alaska in the Society's area of activity; and to change the date of the Annual Meeting to early spring, because of difficulty of travel in mid-January.

Under discussion, the name "Caurinus Club" was suggested. It was the name of the parent organization of the Society. Caurinus has its derivation in the Latin *Caurus*: The Northwest Wind, was apt and short. Correct pronunciation and understanding of the meaning of the word were considered as objections to its use. Another minor objection was the difficulty of making the transition to a new and totally different name. Northwest Bird and Mammal Society was suggested. One objection was a possible confusion with the old Northwest Territories, included in the area of the Missouri River watershed. Likewise, the Pacific Bird and Mammal Society might be construed as including all areas bordering the Pacific Ocean. The name Western Bird and Mammal Society seemed most definitive, but lacked exactness. It had been proposed some years ago, but had not been adopted.

As for including Alaska in the Society's area of activity, it was pointed out that no other organization includes Alaska, as yet,

and that its inclusion might result in increased activity there. Travel to meetings would be difficult, but a Region need not be set up at first.

Objection to holding the Annual Meeting in mid-January had been voiced by members east of the Cascades, who had found road conditions very poor at the time of the last Annual Meeting. It was felt that a meeting in spring might make it easier for members at a distance to attend. The question was raised whether a spring meeting would conflict with week-end field trips.

A motion was passed that the President be asked to appoint a committee to investigate these changes.

The program of the evening consisted of a paper by James A. Macnab of the Lower Columbia Junior College, Longview, Washington, on "Ecological Aspection of the Fauna of the Coast Range Mountains in Northwest Oregon." Murray L. Johnson displayed some specimens and spoke on the distribution of Pigmy Rabbits (*Sylvilagus idahoensis*) in the state of Washington.—MARGARET A. IVEY, *Secretary*.

JUNE, 1949.—A joint meeting of the Society and the Cooper Ornithological Club was held at the University of British Columbia, Vancouver, June 17, in connection with the thirtieth annual meeting of the American Association for the Advancement of Science, Pacific Division.

The morning session was given over to papers presented by members of the Cooper Club, as follows: "Records of Starlings from Oregon," by Charles W. Quaintance, Eastern Oregon College, La Grande; "Breeding Cycles in Hawaiian Sea Birds," by Frank Richardson, University of Nevada, Reno; "Progress Report on the Pacific Gull Banding Project," Angus M. Woodbury, University of Utah, Salt Lake City; "Comments on the Avifauna of Santa Cruz Island, California," by Frank A. Pitelka, University of California at Berkeley.

The afternoon session was given over to papers presented by members of the Pacific Northwest Bird and Mammal Society, as follows: "The Zoological Knowledge of Certain West Coast Tribes," by Erna Gunther, University of Washington, Seattle; "A Study of Asymmetry in *Peromyscus*," by R. R. Huestis, University of Oregon, Eugene; "The Gray Squirrel in the Lower Puget Sound Country," by Theo. H. Scheffer, Collaborator, U. S. Fish and Wildlife Service, Puyallup, Washington, and "The Natural History and Behavior of the Mantled Ground Squirrel (*Citellus lateralis*)" (illustrated by motion pictures), by Kenneth Gordon, Oregon State College, Corvallis.—MARGARET A. IVEY, *Secretary*.

# THE MURRELET

PUBLISHED TRI-ANNUALLY

BY THE

PACIFIC NORTHWEST BIRD AND MAMMAL SOCIETY

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## PACIFIC NORTHWEST BIRD AND MAMMAL SOCIETY

Founded January 7, 1920

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